Batka, Allan

From:	Batka, Allan
Sent:	Thursday, September 17, 2015 10:10 AM
To:	Theodore Pagano, P.E., P.G.
Cc:	Perenchio, Lisa
Attachments:	MP permit application issues 9-17-15.docx

Hello Ted,

I received your voice mail from a few days ago and I'm following up on the outstanding issues we discussed on the telephone. Please see the attached document for the follow-up.

I will be in the office tomorrow (9/18) and can discuss these issues via telephone if you have questions.

Thank you
Allan Batka
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Michigan Potash Operating, LLC
Class 1 permit applications review follow-up
September 17, 2015

1. Pressure & flow monitor range and calibration:

   a. The permit application identifies the injection pressure gage range as 0-8700 psi. The application also estimates the maximum injection pressure (MIP) to be 2500 psi. The range of the gage far exceeds the range of measuring the MIP. Michigan Potash (MP) needs to explain why the gage range is appropriate to measure the estimated MIP. Or, select a gage range that is closer to the predicted MIP measurements. Once the range is established, information regarding the accuracy of the gage is needed. This should include the accuracy/error of measurements made within the predicted operating span of the gage. This information is usually available from the gage manufacturer.

   b. The permit application identifies the annulus pressure gage range as 0-2400 psi. The annulus pressure must be kept at a pressure higher than the MIP, usually but not always, 100 psi higher. The permit application estimates the MIP to be 2500 psi which will result in maintaining an annulus pressure higher than the annulus pressure gage can read. MP must select a gage with a range that will accurately measure the annulus pressure within the operating pressure of the annulus. Once selected, gage information must include the accuracy/error of measurements made within the predicted operating span of the gage. This information is usually available from the manufacturer.

   c. The permit application does not identify the type of flow meter(s) or how it functions, meter range, units of measurement, accuracy, and error within operating span. MP must submit this information to EPA.

   d. The permit application does not clarify the configuration or location of pressure and flow gages/monitors with respect to the three injection wells. MP must submit information that outlines the number of gages/meters used and their relationship to the three injection wells, (i.e., will there only be one set of gages/monitors for all three wells, will each well have its own dedicated set of gages/monitors, will there be some combination of shared and well dedicated gages/monitors ?). If a central computerized data processing unit is used, an explanation is needed as to how it will function and how it will be used to process monitoring data for reporting to EPA, if this is the case.

   e. The permit application identifies that the pressure build up in the injection zone will be monitored, but does not give any details. MP needs to provide a description of the method used to monitor the pressure change in the injection

zone. If a pressure fall off test is used, MP needs to provide a brief description of the procedures of the test.

2. EPA findings for 3 wells in the area of review (AOR):

EPA Region 5 has minimum construction requirements for wells located within the AOR (of proposed injection wells) that penetrate the proposed injection zone. Region 5 requires cemented casing that extends to a minimum of 250 feet above the top of the proposed injection zone for wells within the AOR. In the case of a well that does not have the minimum cemented casing, a plugged bore hole (w/ plug cement that is in contact w/ the surrounding geology) that extends to a minimum of 250 feet above the top of the proposed injection zone may be acceptable.

At this time, the following wells identified within the AOR for the proposed Class 1 injection wells do not satisfy this requirement for the Reed City injection zone:

- Maddern 1, MDEQ #27159
- Thompson 3-36, MDEQ #36110
- Johnson 1-6, MDEQ # 36067

As part of the approval to injection into the Reed City formation, EPA would require a corrective action on these three wells. This corrective action would require MP to raise the top of the cemented casing in each well to at least 250 feet above the top of the Reed City formation. After cementing, evidence of the location of the top of cement in each of these three wells and the bond to the surrounding geology would also be required.

At this time, injection restricted only to the Amherstburg formation (or deeper), as proposed in the permit application, would not need this corrective action requirement.